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ABSTRACT

Two studies examined the effects of different types of imaginal elaborations on recall. In Experiment 1, 6-year-olds, 9-year-olds, and college adults were given 20 word pairs embedded in one of four types of sentences: short plausible, bizarre, personalized, or self-generated. With no mention of a memory test, subjects were asked to use the sentences to generate images and rate their vividness. Findings indicated that recall varied with age and type of elaboration. Subjects who generated their own sentences had the greatest recall. Analysis of the generated sentences showed younger children were more likely than adults to generate personalized elaborations. However, the presence of personalized referents was not enough to enhance memory. Recall was actually lowest in the personalized condition. In Experiment 2, 6-year-olds, 9-year-olds, and college adults generated sentences connecting 20 unrelated word pairs for one of three purposes: to generate images of the words in the pairs by way of helping to create materials for children's stories, to generate images that would help them remember the word pairs, and to help them remember the words. Yoked controls were given sentences generated by age-mates. Findings indicated that memory was better in all conditions requiring sentence generation than among yoked controls. However, recall varied depending on the purpose of generating the sentences. It is concluded that findings have implications for discussions of children's elaborative abilities. (Author/RH)

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Developmental Comparisons of the Effects of Type of Imaginal Elaboration on Memory

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Abstract

These studies examine the effects of different types of imaginal elaborations on recall. In Experiment 1 subjects (6 year olds, 9 year olds and college-adults) were given 20 word pairs embedded in one of four types of sentences (short plausible, bizarre, personalized, or self-generated). With no mention of a memory test, subjects were asked to use the sentences to generate images and rate their vividness. Recall varied with age and type of elaboration. Subjects who generated their own sentences produced the greatest recall. Analysis of the generated sentences showed younger children were more likely than adults to generate personalized elaborations. However, the presence of personalized referents was not enough to enhance memory. Recall was actually lowest in the personalized condition. In Experiment 2, subjects (6 year olds, 9 year olds and college-adults) generated sentences for one of three purposes. Yoked controls were given sentences generated by age-mates. Results indicated that memory was better in all generate conditions compared with yoked controls but the degree of enhancement depended on type of generation. The results of both studies have implications for discussions of children's elaborative abilities.

Children younger than 9 or 10 years of age do not engage in elaborative processing spontaneously, at least in situations that involve deliberate remembering (e.g., McDaniel & Pressley, 1987; Pressley, 1982; Weinert & Perlmutter, 1988). Further, when the experimenter prompts them to do so, young children are much less likely than older subjects to profit from elaborations especially if imagery is involved (e.g., McDaniel & Pressley, 1987). Thus, it is often assumed that young children cannot initiate elaborative processing (e.g., McDaniel & Pressley, 1987; Weinert & Perlmutter, 1988). However, recent studies on children's memory confusions indicate that children as young as 6 are just as likely as older subjects to generate elaborative processing spontaneously, remember these generations, and later use them to discriminate what they said from what they thought (Foley, Santini, & Sopasakis, 1989).

This conflicting picture concerning the elaborative tendencies of young children provides the focus for the present studies. In most research on strategy development, children's propensity to elaborate is assessed during goal-directed activities (e.g., children are explicitly told to generate images to help them remember material). In memory confusion studies, children are not asked to generate images nor do their generations occur during goal-directed activities (Foley, et al., 1989). The purpose of the present studies is to first examine the effects of different types of imaginal elaborators under incidental instructions (Experiment 1) and to then compare the consequences of generating in incidental and intentional situations (Experiment 2).

Experiment 1

Subjects (6 years, 9 years and adults, N = 144) were given the same 20 word pairs embedded in one of four sentence types. In the Short Plausible condition, subjects were given sentences creating plausible connections between each word pair (e.g., The black ant crawled in and out of the teeth of the comb). In the Bizarre condition, the sentences specified a bizarre interactive connection (e.g., The large blank ant was using a comb to fix its hair). The sentences in these two conditions were modified versions of those reported by Kroll, Schepeler, and Angin (1986). In the Personalized condition, the sentences included personal pronouns or referents to encourage autobiographical encodings (e.g., The black ant crawled in and out of the teeth on your comb). Finally, in the Generate condition, subjects generated their own sentences.

Subjects were told we were creating children's stories and we wanted to include sentences that created vivid "pictures in a person's mind." In each condition, the subject was given a word pair, followed by a sentence, and they then created an image based on the information in the sentence. Subjects were asked to help us select "good" sentences by rating on a scale from 1 to 5 the vividness of the image produced by each sentence. The two younger groups were given some practice with what it means to imagine something by discussing the television character Alf, and generating an image of what he looks like. After generating images, subjects were surprised with one free-recall trial followed by a cued recall test (which included 10 distractors).

Results

On the free-recall test, the number of words recalled (first or second in the pair) was counted. Recall varied with age, $F(1,32) = 43.59$, $p < .001$ (see Table 1), but the effect of sentence type was only marginal, $F(3,132) = 2.54$, $p < .06$.

On the cued-recall test, recall also varied with age, $F(2,132) = 28.55$, $p < .001$ and sentence type, $F(3,132) = 16.84$, $p < .001$. As is clear from Table 2, performance was best when subjects generated their own sentences. In comparison to the other sentences, the generated ones were more likely to include personalized referents or remarks, especially for the younger children. However, the mere presence in sentences of personalized referents was not enough to enhance recall; overall performance was poorest in the Personalized condition.

Subjects' identification of the distractors as "new words" on the cued recall test was quite good. Nevertheless, identifications varied with age, $F(2,132) = 3.03$, $p < .05$. The means were 8.59, 9.50, and 8.67 (out of 10) for the three age groups, respectively. They also varied with condition, $F(3.132) = 4.71$, $p < .004$. The means were 7.91, 8.83, 9.42, and 9.50 for the Personalized, Bizarre, Generate and Short Plausible conditions, respectively.

Summary

The results of Experiment 1 suggest that subjects of all ages were able to use sentence elaborations to generate images, and these imaginal elaborations affected cued recall. In Experiment 2, we ask subjects to generate sentences for the purpose of remembering or to generate materials for children's stories to see

if the enhancing effects of generating are diminished by the mention of a memory test.

Experiment 2

Subjects (6 years old, 9 years old, and adult, N = 216) were asked to generate sentences connecting 20 unrelated word pairs and to use those sentences for a specific purpose. One group was asked to generate sentences and to use the sentences to generate images of the words in the pairs. These subjects were led to believe they were helping us create materials for children's stories. A second group was asked to generate sentences and to use those sentences to generate images that would help them remember the word pairs. A third group was asked to generate sentences to help them remember the words; no mention was made of imagery. For each generate group, there was a yoked control group; one member from each yoked control received the sentences generated by an age-mate. These yoked controls resemble the kinds of elaborative conditions that are often used in memory development studies, except the materials are produced by age-mates. Subjects were surprised with a free-recall trial followed by a cued recall test (which included distractors).

Preliminary analyses (based on 70% of the data, N = 216) on the free-recall data show that recall varied with age, but no other effects were significant. However, as shown in Table 3, the effects of generating were quite evident in the cued recall data. Recall increased with age, and it was generally higher for subjects who generated materials than for their yoked controls. In addition, within the generate groups, recall varied depending on the purpose of generating. Thus, the difference between

generate and yoked groups interacted with type of generation involved.

Conclusions

These studies are important in showing that when children produce their own sentence elaborators to guide imagery generation, they seem to have no trouble following imagery instructions (Experiment 1 and 2). Clearly, these generations enhance memory performance, especially when personalized remarks are involved. Furthermore, children do seem to generate images from sentences written by experimenters under incidental conditions (Experiment 1). Thus, the difficulty young children are reported to have by the strategy development literature does not seem to reflect an inability to engage in controlled elaborative processing. Rather, when engaged in goal-directed activities, they seem to have trouble when the source of the elaborations that prompt their imaginal processing is someone other than the children themselves.

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Table 1. Mean Free Recall, Experiment 1

	Age of Subject		
	6 yr	9yr	Adult
Sentence Type			
Short Plausible	2.91	8.50	13.18
Bizarre	5.44	5.58	10.26
Personalized	2.66	7.08	10.50
Generate	4.58	9.66	12.66

Table 2. Mean Cued Recall, Experiment 1

	Age of Subject		
	6yrs	9yrs	Adults
Sentence Type			
Short Plausible	5.08	9.92	12.17
Bizarre	6.00	7.33	10.33
Personalized	5.17	9.58	9.83
Generate	9.75	15.17	14.33

Table 3. Mean Cued Recall, Experiment 2

	Age of Subject		
	6 yrs	9 yrs	Adult
Generate Images for stories			
Generate	8.50	11.11	14.00
Yoked	6.00	9.30	12.42
Generate Images and remember			
Generate	9.25	11.00	16.08
Yoked	5.25	7.50	13.50
Generate Sentences to remember			
Generate	7.80	12.67	14.58
Yoked	5.00	9.00	7.92